Oklahoma Space Grant Consortium
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PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Oklahoma Space Grant Consortium (OSGC) is a Designated Consortium.

PROGRAM GOALS

The program goals for the Oklahoma Space Grant Consortium within our Program Elements – Fellowships, Higher Education, Research Infrastructure, Precollege and General Public are aligned with Outcomes 1, 2, and 3. Our Workforce Development Goals intersect all of our Program Elements.

OKLAHOMA GOALS FOR NASA OUTCOME 1

WORKFORCE DEVELOPMENT GOAL: To enhance state economic and workforce development in aeronautics and space, while providing applied learning experiences for students and faculty.
Objectives to achieve Goal:

- Develop linkages between Oklahoma aerospace industry, researchers, and students that foster the creation of market driven technology products.
- Award competitive grants/fellowships to faculty and diverse student populations to facilitate hands-on learning related to state economic and workforce development.
- Provide University Career Services personnel support to increase their knowledge of employment opportunities within aerospace-related industry and at NASA Centers.

FELLOWSHIP GOAL: To use the NASA mission, facilities, human resources, and programs to provide information, experiences, and research opportunities for students at all levels to support the enhancement of knowledge and skills in the areas of science, mathematics, engineering, technology and geography.
Objectives to meet Fellowship Goal:

- Educate students at all levels by encouraging and supporting interdisciplinary and multi-disciplinary research experiences and education programs.
- To provide support to the science and technology workforce pipeline by including greater participation of individuals who are underrepresented in science, mathematics, technology, and geography in NASA student programs.
- To increase the number of NASA student support opportunities through partnerships and industry collaboration and cooperation

HIGHER EDUCATION GOAL: To use the NASA mission, facilities, human resources, and programs to provide exposure and experiences to educators and faculty, to support the enhancement of knowledge and skills, and to provide access to NASA information in science, mathematics, engineering, technology, and geography.
Objectives to meet Higher Education Goal:

- To provide NASA mission-based programs to demonstrate the integrated education applications of science, mathematics, engineering, technology, and geography for use in student learning activities.
- To provide access to and promote utilization of NASA-related materials and information resources.
- To increase the participation of underserved and underutilized individuals and groups.

RESEARCH INFRASTRUCTURE GOAL: To enhance the research capabilities in the state of Oklahoma in areas related to NASA interests, by supporting research involving students and faculty.
Objectives to meet Research Infrastructure Goal:

- To identify potential NASA related research projects that may be "seed funded".
- To align projects with workforce and economic development goals and objectives.

OKLAHOMA GOAL FOR NASA OUTCOME 2

PRECOLLEGE GOAL: Increase the number of teachers and students, especially those in underserved and underrepresented communities, who are involved in NASA-related education opportunities.
Objectives to meet Precollege Goal:

- Develop opportunities for elementary and secondary education teachers to learn effective use of NASA-content, STEM based, materials and programs in the classrooms.
- Introduce students to Space Exploration to encourage an interest in STEM disciplines.

OKLAHOMA GOAL FOR NASA OUTCOME 3

EXTERNAL RELATIONS GOAL: Improve public understanding and appreciation of science and technology, including NASA aerospace technology, research and exploration missions.
Objective to meet External Relations Goal:

- Provide instructional materials and technologies derived from NASA research and scientific activities that meet the needs and requests from within the community.

PROGRAM/PROJECT BENEFIT TO OUTCOME (1,2, & 3)
Highlights and anecdotes

Outcome 1:

- An Oklahoma State University team was selected as one of the 3 teams in the country to compete in the NASA XHAB competition at the Johnson Space Center. The competition involves the development and testing of an inflatable space habitat.

- A different Oklahoma State University team was selected by NASA to perform experiments in the zero-g simulator. The experiments involved deployment of inflatable structures.

- At Southeastern Oklahoma State University, a $25,000 NSF OK-EPSCoR research grant was received to continue algal biofuels research begun with NASA OSGC augmentation funds, providing additional research opportunities for 2 faculty and 3 students.

- The OSGC-sponsored aircraft design teams won first and second places in the 2010 AIA/Cessna/Raytheon Design Build Fly contest. The contest is the largest collegiate design contest in the world. Over 60 teams from 5 countries participate.

Outstanding Student Researchers Present Scientific Posters at Research Day at the Capitol:

Twenty one undergraduate student researchers from 15 Oklahoma colleges and universities gathered at the State Capitol recently for the 16th annual Research Day at the Capitol. Student participants were hand-selected by their institutions to present scientific research posters during the prestigious event, which is designed to showcase the outstanding research being conducted on Oklahoma college campuses and to make legislators and the public aware of how the research can positively impact our state. Students' posters were competitively judged by an independent panel that selected the top seven research presentations in three categories—overall winner, regional universities and research-intensive institutions. The students below received awards at the conclusion of the event, during an award ceremony hosted by Glen D. Johnson, chancellor of the Oklahoma State System of Higher Education.

First Place, Research-intensive—Kallie Kardokus
Poster Topic: Cancer Research
Institution: University of Oklahoma Health Sciences Center
Hometown: Edmond

Second Place, Research-intensive—Grant DeLozier
Poster Topic: Geographic Information Systems
Institution: University of Oklahoma
Hometown: Duncan

- The OSGC program has truly enhanced Langston University students exposure to the many opportunities available in STEM education, Aerospace industry and research. Since the inception of our OSGC program our students enrolled in Chemistry, Biology, Education, and Technology has increased about 35%. They are engaged in presenting poster research and working with scientists on different STEM research projects. As a result of our Workforce Activities 25% of our students are now completing Internship or employed in STEM related jobs.

- Aleshia Richardson, Math major and Brittany Stoutermire, Biology attended Kennedy Space Center in 2010 to learn about the various opportunities available in education at NASA. They were excited about the vast amount of knowledge and skill set in math that could be used in the classroom and the importance of STEM education. Erica Smith an Agriculture major participated in an internship at Donald Danforth Plant Science Center Study at the University of South Florida during the summer. She stated that this experience provided her with a great opportunity to continue her studies and a desire to conduct research in the future. These are model students that have been exposed to research on different levels in their major field of studies. All three plan to pursue an advance degree. Two of the three plan to become teachers in the next year and a half.

- Karole Blythe, a biology major graduated and is now pursuing a graduate degree in Biology and was invited back to be the keynote speaker for the Research Day Banquet in 2010.

- Mrs. Autumn Susberry, Elementary Education major, was selected to attend the Summer 2010 Johnson Space Flight Center Pre-Service Teacher Institute (PSTI), in Houston, Texas. She was one of twenty-five pre-service teachers who will be meeting with NASA astronauts and doing NASA activities. Pre-service teachers are able to interface with NASA personnel, and tour Johnson Space Center facilities while learning to incorporate NASA's cutting-edge research into lesson plans for middle school students. She was exposed to aerospace, math and science enrichment activities. This Institute is designed to increase skills in teaching math and science while incorporating technology into the curriculum. Mrs. Susberry, is a mentor with STARBASE in Tulsa, Oklahoma and is studying to be an elementary or middle school teacher.

- Geotechniques Field Camp Program: Leveraging funds for the acquisition of high resolution satellite imagery for curriculum development in remote sensing and other geospatial technologies has fostered an active remote sensing student body at East Central University. Remote sensing helps foster an integrated education of science, technology, engineering, and mathematics for use in the student-learning labs in concert with NASA-related materials and information resources from NASA's Earth Observation System (EOS). In addition, a Field Methods and Geotechnical Research course demonstrated to students how to integrate classroom instruction with field research in geography using geospatial technologies. This includes the geographic study of landscapes using the suite of geotechniques taught in the Department of Geography and

Cartography at East Central University. Students are trained in the geographic arts and sciences and then apply geotechnical courses in data collection, geographic information systems, remote sensing, cartography, and research design. Faculty and students travel each Fall semester to a state park in Oklahoma so that students can test their geotechnical skills in a place they know nothing about. For this reason, this trip is important to the advancement of the educational process stressed in the classroom.

- Undergraduate Research: The OSGC support of NASA National Internship Programs has resulted in opening doors to students entering graduate school and/or contractual research employment upon graduation. East Central University has sent two students (summer 2010 and summer 2011) to NASA Centers of Excellence. All students involved in undergraduate research on East Central University's campus have secured graduate research assistantships because they were partially supported by NASA funding.

Outcome 2:

- At East Central University, of 14 2010-2011 awardees, 7 have completed their undergraduate STEM degrees and 7 are still enrolled in STEM majors.

- Sasakwa Tutoring Program: Initiated in concert with Oklahoma's first NASA Explorer School, the Sasakwa Tutoring Program in mathematics continues to be a successful partnership between East Central University (ECU) and Sasakwa Public Schools. This partnership between mathematics majors from ECU and students in Sasakwa Public Schools has provided Sasakwa students more than just mathematics tutoring. These elementary, middle, and high school students have a renewed focus and purpose related to the academic progress since NASA, ECU, and Sasakwa are all supporting their learning and encouraging academic success, which further promotes confidence in their daily lives and activities at school. These students are encouraged to do well in school, think about post secondary education degrees, and dream about the future beyond their small rural town. On the flip side, mathematics students from ECU benefit from the "real-world" experience by being in a teaching and mentoring environment, as well as establishing future contacts and resources and a better chance for employment within their field.

- Exploring NASA with LEGO STEM Camps: Three NASA LEGO camps were conducted (summer, fall, spring) on East Central University's campus and focused on the STEM disciplines by working problems in a team-oriented environment. After attending the NASA LEGO camps, 95% of the participants plan on taking extra science classes in school.

- NASA Day: The Oklahoma Space Grant Consortium (OSGC) support of statewide NASA Day events on college campuses increased student participation in NASA-related events, in addition to educating the community about the importance of the STEM fields. East Central University's event was well-received from students, staff, faculty, and the

community. The event's theme, What Can NASA Do For You, showcased the various programs connected to Oklahoma Space Grant and Workforce Development. Numerous student testimonials credited NASA funding for their successes, especially those students involved with undergraduate research. Two East Central University alumni, one stationed at NASA Ames, and one formerly stationed at Kennedy Space Center, spoke on the advantages of NASA's mission and the possibilities that were opened along each of their journeys. The event ended with a presentation from ECU's first NASA Summer Intern, Kristy Watson. The reception that followed made for a wonderful event.

- Global Youth Service Program: Students receiving scholarship funding from East Central University are expected to volunteer three hours a week in a department of their choice, preferably in their major, a specific field of study, or within the community. One student (Noelle Hurt), took this initiative a bit farther. East Central University Students from Pi Sigma Alpha, the Legal Professionals Association, and Dr. Pappas' Government and Political Science Research Methods celebrated Global Youth Service Day (Friday, April 15th) during Olympic HEROES at the Boys and Girls Club of Ada, Oklahoma. Parents, community members, and volunteers attended the event. This service-learning project, part of NASA's social responsibility requirement, was sponsored by a $500 UnitedHealth HEROES Grant for sporting goods equipment and by an additional $300 donated to the program from Pi Sigma Alpha, the Political Science Honor Society at East Central University, for the purchase of healthy snacks such as oranges, grapes, bananas, carrot sticks, raisins, and ginger snaps. On Global Youth Service Day, the Boys and Girls Club of Ada and friends enjoyed a healthy snack, Olympic-like fun, and the presentation of sporting goods to the club. The UnitedHealth HEROES Grant, not only funded the supply of sporting goods to the club but also allowed participation medals to be given to all students involved in Olympic HEROES as well. Olympic HEROES was a four-month program based on the Olympic Games in which students learned about the benefits of healthy nutrition and physical well-being through lessons on the achievements of Olympians Jesse Owens, Shannon Miller, Nadia Comaneci, and Jim Thorpe. The goal of Olympic HEROES was to leave a lasting impact in both the knowledge and the material needs of students at the Boys and Girls Club of Ada. Olympic HEROES Program Project Director Noelle Hurt believes the goal of the project was met in a fun and friendly way.

Mentors are the key to unlocking a great mentoring program to the world of possibilities for those being mentored. When Kwanti Allison arrives at the STARBASE Oklahoma 2.0 partner school, Hamilton Middle School, she is an example of what mentoring can do for a young person. She was one of the first 40 cadets participating in the STARBASE Oklahoma STARS program in 1993. The group continued to return each summer through high school graduation to the STARBASE classroom for additional Science, Technology, Engineering and Mathematics instruction. She may be all grown up now but the infectious smile and bubbly personality she was known for as a child now graces the face of an energetic mother of one who will complete her bachelor's degree this spring.

She is one of five mentors for one of two sixth grade mentoring programs at Hamilton Middle School and she has had a positive impact on the young scholar-mentees in the club. She is a team

leader with them on the Map It skills as well as Team Exploration and enthusiastic assistant as they work with the ProDesktop CAD program to build signaling devices as part of the STEM communication curriculum.

Allison said, "When I was first introduced to the program, I didn't know what STARBASE was about but I knew it was an opportunity for extracurricular learning. It was very, very fun. It showed me a new twist on learning to keep me and my classmates interested."

Last summer as she prepared to enter her senior year of college at Langston University-Tulsa it was announced they would sponsor an internship at STARBASE Oklahoma. She was invited by her faculty advisor at Langston to apply. She said STARBASE had a special place in her educational journey and she was excited to have a chance to return. Being selected as the STARBASE intern for Langston, "gave me a chance to give another child the same opportunity I had to learn," she said.

"My favorite part is actually working with the students because you can see in their faces they are very interested to be there," Allison said. "When they find out I was a STARBASE student, their faces shine and you can see them start to think and wonder what they will be with they grow up." Kwanti smiles when she thinks back on her experiences and talks about their future and her own. She is definitely providing a great role model for the scholars to see how hard work and determination will open doors and provide greater opportunities for them.

Outcome 3:

- The inventory completed by our Space Grant supported intern has allowed the Museum to maintain relationships with the national Air and Space Museums. This includes the National Museum of the United States Air Force, NASA (JSC, KSC and MSFC), and the Smithsonian National Air and Space Museum. Through these relationships, the Stafford Air & Space Museum has been able to further develop the outreach of our Museum, bringing STEM education to Western Oklahoma. These relationships have also paved the way for the Stafford Air & Space Museum to become a Smithsonian Affiliate which will bring further attention to the opportunities available.

PROGRAM ACCOMPLISHMENTS

Outcome 1: Fellowships

Scholarships were provided to STEM majors to support them in their fields of study as well as support for travel to regional science conferences

Southwestern was able to contribute to OSGC SMART Objectives to meet the goal in the FELLOWSHIP/SCHOLARSHIPS area by placing two interns at NASA centers during Summer 2011– Jamere King, Engineering Technology Major, at Goddard Space Flight Center and Matthew Stangl, Computer Science Major, at Langley Research Center

Two (2) Langston University students participated in an educational tour of the Langley and Goddard Space Centers during the week of March 14-18, 2011. The tour was sponsored by the Oklahoma NASA Space Grant Consortium/NASA EPSCoR. Several OSGC affiliates –faculty, staff, and students- participated in the visit to expand their knowledge, skills, and ability to transfer what they learned to their professions upon entering the workplace. Additionally, they visited and toured the Smithsonian Museums related to space, engineering and technology. This walk through aviation and aerospace history was uplifting to us and gave us a perspective of the future direction of the space program. We came away with a greater respect for the work of NASA and the need for us to chart new directions for future generations.
Science, technology, engineering, and mathematics (STEP) will have a significant impact on the economic life of the nation. We once dominated innovations in industry. Today most of those gains have been lost to our foreign neighbors. Oklahoma is striving to grow its economy by building the aerospace and defense industry. Hopefully, we can continue to grow our manufacturing and research capacity to meet the challenges of tomorrow. Additional investments in these areas with educational support are a significant element to our success as a nation.

Seven students received significant support to work in research laboratories; 4 have used this experience to obtain new paid internships.

One female student was supported after selection as a NASA LARSS summer intern at Langley, VA.

Outcome 1: Workforce Development

Dr. Mark Micozzi and Mr. Todd Essary (Director of the Career Development Center) competitively selected students and supported them in experiences that helped provide for NASA's and the Nation's future science, engineering, and technology workforce requirements. This included career development internships, research opportunities, industry visits, travel to professional conferences, academic coursework, or visits to NASA Centers that may ultimately utilize NASA facilities through internships and job opportunities. A majority of the funds were used to support the mission and goals of the Career Development Center under the direction of Mr. Todd Essary, which included funding for one student intern to assist in the daily functions of the Center. Funds were also used to support two career fairs held on campus by providing advertisement and student volunteer assistance from current NASA Fellows. Funds were also used to support student travel to NASA Centers, career fairs, internships, and job interviews. A portion of the funds provided to East Central University from NASA were leveraged to provide a partnership between both entities.

Career Placement Services continues to find Aerospace opportunities for students at Langston University. As a result of the partnership we have with Tinker Air Force Base 4 (25%) students have completed their internships and are now employed at Tinker Air Force Base.

Scholarship students awareness of career opportunities in the aerospace industry have been enhanced through workshops and seminars conducted by the Career Placement Center on

campus. 25% of the students that attended are exploring job opportunities in the aerospace industry.

Two (2) Career fairs were held during this reporting period with over 300 students participating and four (4) aerospace industries were in attendance. The Director of the Career Placement Center is exploring other avenues for students who are interested in aerospace technology.

Outcome 1: Research Infrastructure

Tissue Equivalent Detectors for Space Crew Dosimetry and Characterization of the Space Radiation Environment: This project was a joint NASA OSGC and Oklahoma NASA EPSCoR effort. In this project there is both a science goal, and an educational goal.
Science Goal: Develop, fabricate, and test progressively sophisticated compact, tissue-equivalent ionization chambers and proportional counters in order to investigate alternative tissue equivalent and tissue-like materials, anode designs, spectrometer circuitry, and approaches to neutron/charged particle discrimination for real-time space radiation dosimetry. Initial testing will be accomplished with high-altitude balloons. Later testing will be accomplished through ground-based particle accelerator facilities.
Educational Goal: The ionization chamber developed in the early part of this project will form the core of a Near Space Standard Science Platform (NS3P) for use by high school and college students conducting experiments with high altitude balloons.

The Center for Spatial Analysis, a part of the University of Oklahoma, reported 2 university / industry collaborations, 4 publications, 5 submitted and funded proposals totaling $1,380,708.

Langston University increased the number of students applying for internships in the STEM areas during this reporting period. There was a 20% increase in the number of students doing research at other universities during the summer 2010 in math and science.

Outcome 1: Higher Education

NASA XHab:
OSU has assembled a team led by students and faculty in the College of Engineering, Architecture and Technology (CEAT) to compete in NASA's XHab (eXploration Habitat) Innovation Challenge sponsored by the National Space Grant Foundation. OSU was one of the 3 teams in the country selected for the final round of participation at JSC. As part of the project, OSU designed, developed and tested a module for the XHab Academic Innovation Challenge. This includes both technical engineering and outreach efforts. The technical effort will begin with a point of departure design and will evolve based upon student design decisions, analysis and testing. The technical portion of the effort will be led by OSU students in the School of Mechanical and Aerospace Engineering (MAE) as part of spacecraft and systems engineering design coursework. They will be assisted by students in architecture, architectural engineering, and human and environmental sciences as part of their senior design effort and graduate students at OSU and mentored by world renowned companies. For the design effort, the team has have

partnered with industrial affiliates ILC Dover and NextGen Aeronautics and additional university partners at OSU.

Mission to Planet Earth Summer Institute – Inter-consortium project -Summer of 2011 the OSGC conducted it 15th annual summer ten day in-residence institute at the University of Oklahoma for pre and in-service teachers and also focused on teacher preparation. The educators were taught how to utilize NASA content to motivate and inspire students while meeting objectives and the Oklahoma Department of Education Priority Academic Student Skills (PASS) objectives.

Aerospace Education – A View From Above focuses on teacher preparation. The teachers complete 30 hours of inquiry-based curriculum, which they expand once they return to their classroom to continue the learning and exploration process
.

Spatial Perspective on Analysis for Social Science Curriculum Enhancement (SPACE) OSGC developed programs that involved faculty from different academic disciplines and institutions from across the country. In cooperation with the Center for Spatially Integrated Social Science at the University of California Santa Barbara, the Center for Spatial Analysis developed, coordinated and led, Spatial Perspective on Analysis for Social Science Curriculum Enhancement (SPACE) Workshop on Remote Sensing and GIS Technologies for 13 university-level social science faculty.

The Southern Nazarene University summer Research Experience for Undergraduate program attracts freshmen and sophomores in STEM majors to conduct a summer research project to train them in the research process. This helps retain STEM majors in their field of study

At Langston University, There has been a 30% increase in the number of students majoring in Chemistry and Biology. Of the thirty-six Langston students who participated in a STEM Education Research Day at Cameron University eleven participants were OSGC scholarship students and won 1st and 2nd place. There were more than 650 posters with at least 1200 in attendance. The Students also participated in Research Day on campus where they presented their research to the community, students on campus and Corporate Leaders visiting our campus. Since inception of the Langston Integrated Network College (LINC) and Oklahoma Space Grant (OSGC) programs we have seen an increase in STEM majors and graduates who are now pursuing advanced degrees at a rate that exceeds our past experiences.

A new State of the Art Pre-Engineering Lab was developed this year and the curriculum has been revised to attract more students. At this time there are ten (10) students enrolled. Two (2) of the students received a OSGC scholarship and are working to recruit more students in the program. The professor is in the process of partnering with community colleges to increase the enrollment for next year. The OSGC students applied and were accepted to participate in the Geo-Spatial workshops held at OU.

Outcome 2: Precollege

Latinas without Borders Conference, sponsored by the University of Oklahoma Center for Spatial Analysis, brought 47 Hispanic females from Oklahoma City area high schools to the university to participate in a daylong conference and luncheon with 34 female Hispanic volunteer mentors and presenters including students, staff and faculty to enable high school completion and promote awareness of how higher education can be an achievable goal for young Latinas.
Southwestern Oklahoma State University hosted thirty seven high school teams from Oklahoma, Texas, Kansas, and Arkansas for the First Tech Challenge robot design competition. Over 350 students and faculty participated. Twenty-two percent of the participants were minority students and thirty-seven percent were female. Three Oklahoma teams from the event will compete in the International Competition at St. Louis, Illinois during the summer of 2011. This is related to NASA's current area of emphasis "Authentic, hands-on student experiences in science and engineering disciplines – the incorporation of active participation by students in hands-on learning or practice with experiences rooted in NASA-related, STEM-focused questions and issues; the incorporation of real-life problem-solving and needs as the context for activities"

Exploring NASA with LEGO:
Mr. Todd Essary hosted host a three day NASA LEGO Education class during the summer and a one day NASA LEGO Education class providing hands-on science, technology, engineering and math projects for K-12 students from East Central University's service area using the College of Continuing Education as its recruiting platform. Students learned about NASA's space exploration endeavors and the solar system through movies and LEGO Education Kits. They built solar cars, performed experiments and learned about using green technology and its importance. Students also learned about architecture and how some structures are modern marvels by building small scale replicas. Participants gained a greater understanding of engineering as they learn to work in teams and used LEGO motorized cars and building sets to complete a set of tasks that used engineering imagination to build unique LEGO vehicles and buildings. Supplies from the LEGO Education and PITSCO Education Programs were utilized.

Outcome 3: External Relations

Geospatial Extension Services Government Agency Training- This 3-day program provided continuing education and spatial literacy for working professionals and assist with geospatial solution implementation.

Outcome 3: Strategic partnerships and linkages with STEM formal and informal education

The Stafford Air & Space Museum (informal education) partnered with SWOSU (formal education) to provide student internships. This included opportunities for students to have employment past their time in school to bridge their income until their career positions start. One student worked at the Museum during her final year as an undergraduate math student, then for the 6 weeks until her interview process completed and she could start at her job. Having her foot in the door allowed her to have employment to support her family immediately after graduation. Another student worked at the Museum through graduate school, completing his

Business Masters program, which made him much more marketable with a B.S. in History. Without the internship, this student would not have been able to attend graduate school.

An afternoon event highlighted the importance of the NASA Space Grant & College Fellowship Program on East Central University's campus. The event, called "What Can NASA Do For You" was open to the community, as well as all faculty, staff, and students.

STARBASE Oklahoma Inc. is developing a network of informed supporters through a public relations outreach to individuals, companies, schools, government agencies and organizations with stated interest in science, technology, engineering and math. Two open houses were held to showcase STARBASE's involvement with OSGC. The first was held in Tulsa at the Tulsa Air and Space Museum's planetarium with 62 attendees. During that meeting, two new partnerships were formed with a university and a local engineering society. Follow-up with the Engineering society further produced a connection with a national organization for women engineers. These contacts have enhanced the 2.0 Mentoring program.

The Lawton Open House strengthened our partnership with Fort Sill and Lawton Public Schools. Thirty-four people attended that event. STARBASE visibility has grown in the school system and at Ft. Sill.

PROGRAM ACCOMPLISHMENTS

NASA 2010 Education Priorities: *Accomplishments related to the "Current Areas of Emphasis" stated in the 2010 Space Grant solicitation. Report on areas that apply to work proposed in your proposal and budget:*

- Authentic, hands-on student experiences in science and engineering disciplines – the incorporation of active participation by students in hands-on learning or practice with experiences rooted in NASA-related, STEM-focused questions and issues; the incorporation of real-life problem-solving and needs as the context for activities.

Authentic hands on experiences at Oklahoma State University involving space grant include:

- Design/Build/Fly international aerospace design contest
- ASTRO balloon program
- XHab
- Zero-gravity team
- Rocket design team

The Southern Nazarene University summer REU program helps promote STEM careers by training students in how to conduct scientific research which can lead to applications for graduate school

At Cameron University, students participate in the NASA Moon Buggy Challenge.

Augmentation funds allowed the initiation of an algal biofuels project involving undergraduate researchers and related to NASA's terrestrial and space fuel requirements.

7 Geoinformatics majors have obtained geospatial internships with the City of Norman, Conoco Phillips, Cobb Engineering, Oklahoma Department of Wildlife and Chesapeake Energy

-The Center for Spatial Analysis has funded 4 undergraduate research assistantships and 9 graduate research assistantship with external funds

-GIS Day at the Capitol field trip – provided transportation for 13 Geoinformatics majors and CSA students to attend and present their projects to the professional GSI community with 51 private and public agencies.

-6 Workforce Development Awards – students participate in professional activities such as the South Central Arc User Group meeting and conference, External Relations such as GIS Day @ the Capitol, research projects, educational outreach such as GIS Day geocache contest and service activities for the College of Atmospheric and Geographic Sciences. 1 graduated this spring (Hispanic female minority), 5 continuing in program (non minorities, 3 female, 2 male).

The Langston University OSGC program sponsored a sophomore Edmond Santa Fe High School student to participate in a FIRST Edmond Santa Fe 2359 Robotic Competition held in St. Louis, Missouri. They won the first robetic competition engineering inspiration award at 2011 Oklahoma Regional for their Sciencing on Saturday (SOS). SOS workshops are held on Saturday to promote interest in STEM Programs. The student came in 3rd place. The student gained valuable information on how to build and compete with a robot of their own design, qualify for scholarships. The student's goal upon completing high school is to become an engineer.

"…The students enjoyed all of the hands on activities and many of them carried the knowledge back to the classroom and applied it at different times during classroom instruction." 5th grade teacher, Tulsa, OK

"This program did an excellent job teaching my students math and science through hands on experiences. The instructors reached every child on their individual learning level. The students loved going to STARBASE and couldn't wait to go back every week! Thank you for this program." 5th grade teacher, Burns Flat, OK

"Last year our 5th graders improved on their State CRT test [state standardized test]. I know it was due to their participation in STARBASE!" 5th grade teacher, Oklahoma City, OK

"The kids had a great time and the material was great. Importantly the content covered was directly aligned to state standards…" *5th grade teacher, Tulsa, OK*

"Our students have attended STARBASE for several years. This was the best year ever! The revisions of the curriculum and the log books have made learning more interesting. We have enjoyed outstanding teachers who have challenged, engaged, created, corrected, and encouraged our children. We appreciate the tremendous opportunity to participate in such an outstanding program." *5th grade teacher, Tulsa, OK*

NASA 2010 Education Priorities:

- Engage middle school teachers in hands-on curriculum enhancement capabilities through exposure to NASA scientific and technical expertise. Capabilities for teachers to provide authentic, hands-on middle school student experiences in science and engineering disciplines (see above).

The Education and Mathematics departments are sponsoring a Professional Development pre-service and in-service teacher workshop that will be held this summer at Langston University. Twenty (20) Middle school science and math teachers will engage in rocketry science and Geometry. This workshop will be conducted to enhance teachers in STEM education and emphasize math concepts, hands-on manipulations and use of technology to ensure that participants are familiar with the knowledge of the concepts taught in the pertinent grade levels. Teachers will develop the knowledge, skills, and ability to integrate and infuse STEM subjects for daily living into their lesson plans and curriculum. During the workshop participants will learn how to construct and demonstrate a rocket in class. This will enhance students learning in a classroom environment and make learning both interesting and exciting.

Exploring NASA with LEGO training day (Fall 2010); Todd Essary hosted a training session for local middle school teachers on how to use NASA's website and LEGOS to focus on the STEM disciplines

In FY2010, STARBASE curriculum lessons focused on hands-on STEM including physics, chemistry, astronomy, technology, engineering, mathematics and STEM careers.

STARBASE served 221 classroom teachers from 103 schools across Oklahoma and 4,525 students. These numbers include the traditional STARBASE program focusing on 5th graders and the after school program focusing on 6th – 8th graders. These numbers do not include summer programs.

Five teachers' meetings were conducted for the 21 STARBASE teachers focusing on the STEM curriculum and best practices in hands-on and inquiry-based learning. An additional two-day meeting and workshop took place in July 2011.

In FY2010, one teacher workshop was conducted focusing on hands-on STEM curriculum for the classroom. This workshop, Flying and Floating, was conducted September 30, 2010 with 16 teachers (grades 5-12). A second workshop will be conducted on August 2 and 3, 2011 for up to 24 teachers (primarily 5th grade teachers). A third workshop will be conducted in September 2011 for a maximum of 25 teachers (grades 5-12).

Four training workshops for mentors for the after school STEM middle school program were conducted resulting in a total of 34 trained mentors.

NASA 2010 Education Priorities:

- Summer opportunities for secondary students on college campuses with the objective of increased enrollment in STEM disciplines or interest in STEM careers.

The Intensive Math and Science Academy was held during the summer where (40) students across the state of Oklahoma attended a two week on campus Academy. Students are introduced to new math techniques to improve students' appreciation for math and science curricula careers. The students will experience workshops on library research, web construction and design , mathematical scientific problem solving as well as intensive, positive experiences in mathematics, chemistry, biology and technology. Speakers from departments on campus presented information on college life and career opportunities. In the past 3 yrs. ten (10) students that participated in the math and Science Academy are now students at Langston University and five (5) are majoring in STEM disciplines.

Todd Essary taught a three day summer camp "Exploring NASA with LEGO" for students.

NASA 2010 Education Priorities:

- Community Colleges – develop new relationships as well as sustain and strengthen existing institutional relationships with community colleges.

The pre-engineering program at Langston University is collaborating with Rose State, Redland College, Oklahoma Community College and Tulsa Community College in a 2+ 2 to increase enrollment in the pre-engineering and STEM disciplines. This collaboration will strengthen and increase the number of minority students majoring in STEM areas.

NASA 2010 Education Priorities:

- Aeronautics research – research in traditional aeronautics disciplines; research in areas that are appropriate to NASA's unique capabilities; directly address the fundamental research needs of the Next Generation Air Transportation System (NextGen).

Reserch at Oklahoma State University involving Space Grant, focuses on development of computer prediction codes which can predict aeroelastic effects as well as flight dynamics, in order to support NASA Dryden flight test operations.

NASA 2010 Education Priorities:

- Environmental Science and Global Climate Change – research and activities to better understand Earth's environments.

This project is still in early stages collecting climate and landcover data and developing analysis tools and a web GIS for spatial analysis of climate events in Oklahoma, Texas, Louisiana, Tennessee, and Mississippi. The student working on the project for the 2010/2011 academic year has graduated and is working full time for the NOAA/ DOD Radar Operations Center.

4-H National Science Experiment:
Members of the STARBASE Jets 4-H Club, a club sponsored by STARBASE Oklahoma Inc and the 138th Fighter Wing for families of military members, participated in National 4-H Science Day activities during their October 2011 meeting. The activity questioned: Why Water Quality? Why Now? Water quality is a term used to describe the chemical, physical, and biological characteristics of water. Today, as our population evolves, we face a growing concern that our sources of clean water are becoming contaminated by warming temperatures, carbon dioxide emissions and dangerous run off. These changes in the water quality affect not only our drinking water supply, but also the natural habitats of aquatic plants, animals and organisms. The 4-Hers conducted the experiments and then took home their workbooks to go over the information on calculating their carbon footprint

NASA 2010 Education Priorities:

- Diversity of institutions, faculty, and student participants.

Diversity numbers in terms of participants, is at or above the appropriate state demographics in all categories. In terms of institutions, OSGC has a very involved group of affiliates.

PROGRAM CONTRIBUTIONS TO PART MEASURES

Longitudinal Tracking: Total scholarship and fellowship awards = 117. Our grant period dates (August 15 - August 14) necessitate the awarding of higher education and research infrastructure funds in the spring and summer of 09. Forty of the total awards represent underrepresented minorities. Five students have accepted positions in space related industry, 3 are employed within K-12 STEM academic fields and 3 are employed in “other” STEM academic fields.
Course Development- ASTRO Introduction to Aerospace Engineering: Atmospheric and Space Threshold Research Oklahoma (ASTRO) became a new course in the aerospace engineering curriculum to provide hands-on experiences for incoming freshmen. Introduction to Robotics is a

one-hour course initiated by another new affiliate, Southwestern Oklahoma State University (SWOSU) and fully funded by OSGC. The course targets students in the Cheyenne and Arapaho Tribal College (CATC) newly hosted on the SWOSU campus. Geospatial Summer Institute – Inter-consortium project- This annual institute provides excellent opportunities for students from five regional universities, a private university, and two state research universities, in a class working side by side, to learn remote sensing, GIS, and GPS. Matching Funds: OSGC leveraged NASA funds 2:1 for the reporting period. Minority-Serving Institutions: The interactions between Langston University, an HBCU, and the Oklahoma Space Grant are best highlighted through our Scholarship program:
OSGC Scholarship opportunities were provided to thirty Langston University students during the past year.. These awards were scholarships, financial support for tuition and books, and stipends.
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Six Langston OSGC scholars were selected to participate in a Pre-Service Poster Session Conference during the fall and spring semester in Alexandria, VA sponsored by NASA, the University of Maryland Eastern Shore, and the National Institute of Aerospace. The students also presented their lesson plan entitled "Making a Difference": Creating Pathways to Inspire the Next Generation of Explorers" during the Research Day Symposium held May 2008 at Langston University. Research Day at Langston is open to the public.
Each year students participate in a Research symposium on Langston University's campus. Out of the (40) forty students participating eight (8) were OSGC students.
OSGC students were paired with faculty members in their respective areas of study to provide services, mentoring and research during the school year.
The State of Oklahoma held EPSCOR Research Day at the Capitol during the month of March 2008. Two OSGC students were selected in the activity this year from students across Oklahoma.

IMPROVEMENTS MADE IN THE PAST YEAR

Began a new statewide meeting procedure in which meetings rotate around the state instead of all focusing on one location.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

OSGC represents a state-wide partnership of universities, a Cooperative Extension Service, State Government, City Government, industry, an aerospace education organization, and a major science museum to enhance opportunities for Oklahomans to understand and participate in NASA's Mission by supporting programs in science, technology, engineering, mathematics, and other aeronautics and space-related disciplines throughout the State.
Every OSGC affiliate played an active role in moving OSGC toward our Vision Statement. We achieved many of our accomplishments by exploiting Oklahoma's unique NASA-related assets: 1) over 350 small to medium aerospace companies, and, 2) GeoEye (formally Space Imaging), the world's most comprehensive supplier of earth imagery and derived geographic information and services, including one of three worldwide tracking stations located in Norman, Oklahoma. Our Consortium capitalized on these unique State assets to develop activities that targeted three core categories – State Economic and Workforce Development, Geographic Information Sciences (GIScience), and Fellowships.

University Affiliates

The University of Oklahoma – lead institution
Oklahoma State University
Cameron University
Langston University – an Historically Black College and University
East Central University
Southeastern Oklahoma State University
Southern Nazarene University
Southwestern Oklahoma State University

Academic Affiliates

Application Engineering Program
Center for Spatial Analysis

Industrial Affiliates

Frontier Electronic Systems Corporation
Science Applications International Corporation
Informal Science Education Affiliates
Tom Stafford Air and Space Museum
STARBASE Oklahoma, Inc.

City Government Affiliate

Norman Economic Development Coalition